

AMENDMENTS TO THE CLAIMS

1-20. (Canceled)

21. (Currently amended) A piston type pumping apparatus configured for pumping a fluid, comprising:

- a vertically oriented cylinder having a top and bottom;

- a first passageway for hydraulic fluid adjacent to the bottom of the vertically oriented cylinder;

- a second passageway for the hydraulic fluid adjacent to the top of the vertically oriented cylinder;

- a piston reciprocatingly mounted within the vertically oriented cylinder having a top area against which the hydraulic fluid acts in a direction of movement of the piston and a bottom area against which the hydraulic fluid acts in the direction of movement of the piston;

- a hollow piston rod connected to the piston and mounted within the vertically oriented cylinder, wherein the hollow piston rod comprises a first one-way valve;

- a transfer chamber ~~located above~~ sealingly attached to the top of the vertically oriented cylinder at a position radially spaced apart from the first aperture such that a top portion of the hollow piston rod extends reciprocatingly and sealingly through a first aperture in the top of the vertically oriented cylinder and into the transfer chamber, wherein the first one-way valve is positioned to allow fluid flow from the hollow piston rod into the transfer chamber and wherein the piston rod does not contact an interior side surface of the transfer chamber;

- a discharge chamber located above and in fluid communication with the transfer chamber, wherein the discharge chamber and the transfer chamber are connected by a third one-way valve configured to allow fluid flow from the transfer chamber into the discharge chamber;

- a reload chamber located below the vertically oriented cylinder such that a bottom portion of the hollow piston rod extends reciprocatingly and sealingly through a second aperture in the bottom of the vertically oriented cylinder and into the reload chamber, wherein fluid in the reload chamber may flow into the bottom portion of the hollow

piston rod, wherein an inside diameter of the cylinder is greater than an inside diameter of the reload chamber and ~~wherein the transfer chamber is sealingly attached to the cylinder at a location spaced apart from the first aperture;~~ and

a second one-way valve located in the reload chamber, wherein the second one-way valve is positioned to allow fluid flow into the reload chamber from outside the piston type pumping apparatus.

22. (Previously presented) The apparatus of Claim 21, wherein the piston is annular in shape.

23. (Previously presented) The apparatus of Claim 21, wherein the first one-way valve includes a first valve member, a first valve seat and a first valve passageway, the second one-way valve includes a second valve member, a second valve seat and a second valve passageway, and the third one-way valve includes a third valve member, a third valve seat and a third valve passageway.

24. (Previously presented) The apparatus of Claim 21, wherein the hollow piston rod is cylindrical in shape.

25. (Previously presented) The apparatus of Claim 21, wherein the reload chamber is sealingly attached to the cylinder apart from the second aperture.

26. (Canceled)

27. (Previously presented) The apparatus of Claim 21, wherein the discharge chamber is sealingly attached to the transfer chamber apart from the third one-way valve.

28. (Canceled)

29. (Previously presented) The apparatus of Claim 21, wherein the inside diameter of the cylinder is greater than an inside diameter of the transfer chamber.

30. (Canceled)

31. (Previously presented) The apparatus of Claim 21 further comprising a pump connected to the first passageway for pumping the hydraulic fluid into the vertically oriented cylinder.

32. (Previously presented) The apparatus of Claim 31, wherein the pump is a piston type pump.

33. (Previously presented) The apparatus of Claim 32, wherein the pump is located above the second passageway.

34. (Previously presented) The apparatus of Claim 31, wherein the pump is a centrifugal pump.

35. (Currently amended) A method for pumping fluid, comprising:

introducing a power fluid into a piston-type pumping apparatus through a first passageway in a vertically oriented cylinder, whereby a piston housed within the vertically oriented cylinder is raised, whereby a hollow piston rod attached to the piston rises upwardly through a first aperture in a transfer chamber, which transfer chamber is sealingly attached to the top of the vertically oriented cylinder in a position radially spaced apart from the first aperture such that the top portion of the hollow piston rod does not contact an interior side surface of the transfer chamber as it rises upwardly through the first aperture, wherein a first one-way valve in the hollow piston rod is closed, whereby liquid is prevented from flowing from the transfer chamber into the hollow piston rod, whereby the hollow piston rod attached to the piston rises upwardly through a second aperture in a reload chamber, wherein an inside diameter of the cylinder is greater than an inside diameter of the reload chamber, wherein a second one-way valve is opened to allow liquid flow into the reload chamber from outside the piston-type pumping apparatus, and wherein raising the hollow piston rod upwardly into the transfer chamber displaces fluid in the transfer chamber through a third one-way valve into a discharge chamber; and

introducing fluid through a second passageway into the vertically oriented cylinder, whereby the piston is lowered and hydraulic fluid exits the vertically oriented cylinder through the first passageway, wherein the third one-way valve is closed, thereby preventing fluid flow from the discharge chamber into the transfer chamber, wherein the second one-way valve is closed thereby preventing fluid flow from the reload chamber and the hollow piston rod from exiting the piston-type pumping apparatus, and wherein the first one-way valve is opened to allow fluid to flow from the reload chamber and the hollow piston rod into the transfer chamber.

36. (Previously presented) The method of Claim 35 further comprising priming the reload chamber.

37. (Previously presented) The method of Claim 36, wherein priming the reload chamber comprises

filling the reload chamber, the hollow piston rod and the discharge chamber with fluid to be pumped;

placing the piston in its lowermost position adjacent to the bottom of the vertically oriented cylinder; and

closing the first one-way valve, the second one-way valve and the third one-way valve.

38. (Previously presented) The method of Claim 35, wherein the third one-way valve prevents liquid in the discharge chamber from reentering the transfer chamber.

39. (Previously presented) The method of Claim 35, wherein an inside diameter of the piston rod is less than or equal to the inside diameter of the reload chamber and an inside diameter of the transfer chamber, respectively.

40. (Previously presented) The method of Claim 35, wherein increasing an inside diameter of the piston rod increases a volume of fluid pumped by the apparatus.

41. (Previously presented) The method of Claim 35, wherein increasing a piston surface area increases a force on the piston rod acting on fluid in the transfer chamber.

42. (Currently amended) A piston type pumping apparatus configured for pumping a liquid, comprising:

a vertically oriented cylinder having a top and a bottom;

a first passageway for liquid in the vertically oriented cylinder, wherein the first passageway is adjacent to the top of the vertically oriented cylinder;

a second passageway for hydraulic fluid in the vertically oriented cylinder, wherein the second passageway is adjacent to the bottom of the vertically oriented cylinder;

a piston reciprocatingly mounted within the vertically oriented cylinder, the piston having a top surface configured to be in contact with liquid in the vertically oriented cylinder, the piston further having a bottom surface configured to be in contact with the

hydraulic fluid acting against the bottom surface of the piston in a direction of movement of the piston;

a piston rod connected to the piston and extending slidably and sealingly through a first aperture in the bottom of the vertically oriented cylinder, the piston rod further extending slidably and sealingly into a reload chamber through a second aperture in the reload chamber, wherein the reload chamber is situated below the vertically oriented cylinder, and wherein the bottom portion of the piston rod has a bottom surface having a diameter, wherein the piston rod diameter defines the bottom surface area of the piston rod that contacts the liquid, wherein the piston rod diameter is smaller than an inside diameter of the reload chamber, the piston rod having a third passageway for liquid extending from the bottom surface of the piston rod to the top surface of the piston, such that the piston rod connected to the piston is configured to permit passage of liquid therethrough, wherein the bottom surface of the piston rod is situated within the reload chamber, wherein the bottom surface of the piston rod is configured such that liquid in the reload chamber acts upwardly against the bottom surface of the piston rod in a direction of movement of the piston and piston rod, and wherein the bottom surface of the piston rod has an area smaller than the top surface of the piston, whereby liquid in the vertically oriented cylinder acting downwardly on the top surface of the piston exerts a greater force on the top surface of the piston than liquid in the reload chamber acting against the bottom surface of the piston rod;

a first one-way valve situated in the third passageway configured to permit liquid to flow from the reload chamber into the piston rod and piston and which is configured to prevent liquid from flowing from the piston rod and piston into the reload chamber;

a fourth passageway configured for passage of liquid into the reload chamber from a source of liquid to be pumped;

a second one-way valve in the fourth passageway configured to permit liquid to flow from the source of liquid into the reload chamber and which is configured to prevent liquid from flowing from the reload chamber towards the source of liquid to be pumped; and

a receiver in fluid communication with the second passageway, wherein the receiver is configured for receiving the hydraulic fluid displaced as the piston moves downwardly, and wherein the receiver is configured to assist in raising the piston to pump liquid upwardly and through the first passageway.

43. (Previously presented) The apparatus of Claim 42 wherein the receiver is configured to store the hydraulic fluid.

44. (Previously presented) The apparatus of Claim 43, further comprising a pump connected to the receiver and configured to assist in raising the piston.

45. (Previously presented) The apparatus of Claim 44, wherein the pump connected to the receiver is a piston type pump.

46. (Previously presented) The apparatus of Claim 45, wherein the pump connected to the receiver is situated above the second passageway.

47. (Previously presented) The apparatus of Claim 44, wherein the pump connected to the receiver is a centrifugal pump.

48. (Previously presented) The apparatus of Claim 42, further comprising a fifth passageway in the vertically oriented cylinder, a first conduit connecting the fifth passageway to the receiver, and a second conduit connecting the pump connected to the receiver to the second passageway, wherein the fifth passageway is situated below the second passageway.

49. (Previously presented) The apparatus of Claim 48, further comprising a third one-way valve adjacent to the fifth passageway in the second conduit.

50. (Currently amended) A system for pumping, the system comprising:

a first chamber having a top interior surface, a bottom interior surface, and interior side surfaces;

a piston and piston rod component having a piston portion joined to a piston rod portion, wherein the piston portion of the piston and piston rod component is disposed within the first chamber, the piston portion of the piston and piston rod component having a first surface, wherein the first surface is slidably disposed within the interior side surfaces, wherein the piston rod portion of the piston and piston rod component has a bottom portion and a surface opposite to the first surface of the piston portion of the piston and piston rod component, wherein the bottom portion extends through a first

aperture in a bottom of the first chamber, wherein the first surface has a larger area than the surface opposite, and wherein the piston and piston rod component has an aperture extending from the first surface to the surface opposite and configured for passage of liquid therethrough;

a first passageway situated adjacent to the top interior surface of the first chamber and above the first surface;

a second passageway in the first chamber located below the first surface;

a second chamber configured to contain a pressurized liquid or a pressurized gas, in fluid contact with the second passageway;

a first one-way valve disposed in the bottom portion of the piston rod portion of the piston and piston rod component;

a third chamber having a second aperture, the third chamber comprising an interior side surface, wherein the bottom portion of the piston rod portion of the piston and piston rod component is disposed within the second aperture, wherein [[a]] no surface of the bottom portion of the piston rod portion of the piston and piston rod component ~~does not contact~~ contacts the interior side surface of the third chamber; and

a second one-way valve disposed within the second chamber.

51. (Previously presented) The system of Claim 50, further comprising a pump associated with the second chamber.

52. (Previously presented) The system of Claim 51, wherein the pump is a piston-type pump.

53. (New) The apparatus of Claim 21 further comprising a pump connected to the first passageway for pumping the hydraulic fluid into the vertically oriented cylinder and wherein the pump is located above the second passageway.